

Client's Ref.:  
File: 7084-A21007PCTUS/Chiumeow/Kevin revised/fl

# **TITLE**

## **SPONGE PROPHY**

### **BACKGROUND**

The invention relates to hydrophilic sponge processing,  
5 and a cleaning, polishing, and burnishing prophy chip  
utilizing a hydrophilic sponge.

Generally, conventional dental cleaning is performed  
with a prophy chip (cup), mounted on a dental instrument,  
composed of silicon gum with a dental polishing gel or  
10 paste, or the polishing paste may be directly applied to  
appliances to clean, polish, or burnish the teeth. However,  
the top of the prophy chip may be twisted or frayed when  
polishing the embrasure or its adjacent side, and the prophy  
cup cannot reach the target sites.

15 In addition, polishing gel or paste may escape the oral  
cavity due to rotation when cleaning teeth with the prophy  
chip composed of silicon gum. The supplement of the  
polishing gel or paste for preventing heat generated by  
friction between the silicon gum and teeth and maintaining  
20 polishing efficiency is required, and this also interrupts  
the operation.

To solve these problems, a polishing grindstone sponge  
requiring no polishing paste maybe applied, and the  
drawbacks of the silicon gum during polishing do not occur.

25 The invention provides a prophy chip for cleaning,  
polishing, and burnishing teeth reducing heat generated by  
friction without requiring a polishing paste.

Client's Ref.:  
File: 7084-A21007PCTUS/Chiumeow/Kevin revised/fl

### SUMMARY

A prophy chip is provided, mounted on the top of a dental rotary instrument, comprising a hollow cup-shaped core of canopy (semispherical) type, cylindrical type, cup  
5 type, cone type, inverted cone type or disk type, covered with a hydrophilic grindstone sponge containing a polishing agent such as aluminum oxide, silicon carbide, cerium oxide, or pumice, the hydrophilic grindstone sponge side edge either being press fixed by folding into the interior of the  
10 core with a shank-equipped latch plate or contoured for gripping, a shaft fixed to avoid vibration around the latch plate bottom surface rotation axis during rotation.

With the prophy chip of the invention, the contact side of the sponge which lines the core may be deformed to the  
15 core shape during cleaning and polishing. For example, the top of the cone-type core reaches embrasures without twisting, and the flexible surface of the sponge provides even contact and cleaning to the polishing face of the tooth. In another example, the prophy chip of the  
20 invention, even with the conventional inflexible silicon gum, still prevents the deformation of the top of the core. In practice, the indisposition by the lash of the friction between the stiff chip and the teeth can be reduced and the teeth cleaning and polishing can be properly operated by the  
25 flexible sponge.

Moreover, the cleaning, polishing, and burnishing can be operated by the hydrophilic sponge of the invention with abundant water, providing more effective dissipation of heat generated by friction.

Client's Ref.:  
File: 7084-A21007PCTUS/Chiumeow/Kevin revised/fl

Furthermore, solid agents in the hydrophilic sponge may dissolve and be released to the polishing face by centrifugal force, rolling friction, and pressure. Medicaments, polishing agents, or coating agents contained  
5 in the sponge may be dissolved and released to the contact face between the tooth and the rotating polishing chip. Sweeteners and fragrances can be diffused in the oral cavity during cleaning, polishing, and burnishing by a mediator such as saliva, providing refreshment and aromatherapeutic  
10 effects.

In particular, the prophylaxis chip of the invention, mounted on the rotary dental instrument, capable of polishing difficult areas such as the embrasure or its adjacent side. In addition, polishing paste is not required  
15 during the operation, such that interruption of the procedure caused by the application of polishing paste in conventional operation does not occur. The disposition on the surfaces of treated teeth by friction between the stiff chip and the teeth can be reduced and teeth cleaning and  
20 polishing can be properly operated using the flexible sponge immersed in water prior to the operation, reducing heat generated by friction.

In addition, the hydrophilic sponge of the invention comprises at least one water soluble agent such as a  
25 polishing agent, a foaming agent, a medicament for inhibiting or preventing periodontal diseases or dental caries, or a coating agent. These agents can be dissolved and released to the surfaces of teeth or the entire oral cavity by water or saliva during cleaning, polishing, and

Client's Ref.:  
File: 7084-A21007PCTUS/Chiumeow/Kevin revised/fl

burnishing for caries prevention, dental coating, as well as refreshment and aromatherapeutic effects.

Additionally, the hollow core of the invention may be filled with a water-retaining material, providing  
5 dissipation of heat generated by friction, also prolonging the effect of the medicaments.

#### BRIEF DESCRIPTION OF THE DRAWINGS

The invention can be more fully understood and further advantages become apparent when reference is made to the  
10 following description and the accompanying drawings in which:

FIG. 1 is a cross-section of a spherical sponge prophy in one embodiment of the invention.

FIG. 2 is a cross-section of a cylindrical sponge  
15 prophy in another embodiment of the invention.

FIG. 3 is a cross-section of a conical sponge prophy in another embodiment of the invention.

FIG. 4 is a cross-section of the spherical sponge prophy contacting a surface of a tooth and the hydrophilic  
20 grindstone sponge deforming accordingly.

FIG. 5 is a cross-section of the cylindrical sponge prophy contacting a neck of a tooth and the hydrophilic grindstone sponge deforming accordingly.

FIG. 6 is a cross-section of the conical sponge prophy  
25 contacting an embrasure and the hydrophilic grindstone sponge deforming accordingly.

FIG. 7 is an exploded view of a sponge prophy in an embodiment of the invention, showing a plurality of pores in the sponge prophy transferring agents therethrough.

Client's Ref.:  
File: 7084-A21007PCTUS/Chiumeow/Kevin revised/fl

FIG. 8 is a lateral view of a dental rotary instrument equipped with a sponge prophylaxis in one embodiment of the invention.

Symbol legends:

- 5        1~core; 2~hydrophilic grindstone sponge; 3~latch plate;  
4~axis; 5~connection of axis and dental rotary instrument;  
6~tooth (teeth); 7~hydrophilic grindstone sponge deformed by  
pressing; 8~pore; 10~grip of the body of the dental rotary  
instrument; 11~head of the dental rotary instrument;  
10      12~switch of the dental rotary instrument; and 13~sponge  
prophylaxis.

#### DETAILED DESCRIPTION

Practical embodiments of the invention are described herein in accordance with the figures.

- 15        FIGs. 1-3 show embodiments of the invention, wherein  
like symbols indicate identical elements, showing basic  
components of the dental rotary instrument (or prophylaxis  
sponge), with elements the same as the conventional dental  
rotary instruments omitted. The invention features  
20      replacement of the conventional chip composed of silicon gum  
with a hydrophilic grindstone sponge, as shown in FIG. 1.

The processing of these figures is further illustrated below.

- 25        The sponge prophylaxis as shown in FIGs. 1-3 is mounted on  
the dental rotary instrument as shown in FIG. 8. The  
hydrophilic sponge can be hydrophilic latex sponge, or  
polyurethane sponge, and the hydrophilic latex sponge or the  
hydrophilic polyurethane sponge comprises a grindstone of  
 $\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$  or  $\text{Ca}_{10}(\text{PO}_4)_6\text{F}_2$  as a wet grindstone sponge.

Client's Ref.:  
File: 7084-A21007PCTUS/Chiumeow/Kevin revised/fl

The outside of the core is nonwoven to maintain the grindstone and has hydrophilicity and flexibility. The outside of the sponge covering the core is a three-dimensionally continuous, porous film conducting a solution  
5 immersing in a flexible polishing agent. Sponge prophylaxis 13 contacts the surface of the tooth, and the switch 12 of the dental rotary instrument is turned on. Sponge prophylaxis 13 is immersed in water prior to the operation and agents such as various medicaments, sweeteners, fragrances, dental coatings  
10 are dissolved on the contact surfaces between the teeth and the operating polishing chip, providing prevention periodontal diseases and dental caries, aromatherapy and refreshment effects, efficiency of cleaning, polishing, and burnishing, and inhibition of heat generated by friction.

15 In the embodiment of cleaning the surface of a tooth, the spherical sponge prophylaxis as shown in FIG. 1 is applied to cleaning concaves such as the facies labialis dentis and the tongue side fossa as shown in FIG. 4. In the embodiment cleaning the neck of a tooth, the cup-shaped core covered  
20 with a hydrophilic sponge as the sponge prophylaxis shown in FIG. 2 is applied to the curved surface of the neck of a tooth without damaging the gums as shown in FIG. 5, in which the teeth contact surface of core 1 is curved. The effect of this embodiment is similar to that of the conventional cup-shaped prophylaxis chip. In the embodiment cleaning embrasures  
25 between the teeth, the conical sponge prophylaxis as shown in FIG. 3 is applied to confining sites such as the embrasures between teeth as shown in FIG. 6, in which core 1 has a conical top suitable for the embrasures. This embodiment

Client's Ref.:  
File: 7084-A21007PCTUS/Chlumeow/Kevin revised/fl

prevents chopping of the sharpened and thin top of the conventional silicon gum.

In addition, the hollow portion of core 1 as shown in FIG. 7 can be filled with agents such as various medicaments, a sweetener, a fragrance, or a coating agent. Hydrophilic grindstone sponge 2 is immersed in water prior to the operation, and the agents can be dissolved and released through pores 8 to the surface of hydrophilic grindstone sponge 2, providing various medical or aromatherapeutic effects. In the embodiment, the hollow portion of core 1 is filled with a water-retaining material, providing dissipation of heat generated by friction, and prolonging the effect of the foaming agent, the sweetener, the fragrance, the medicament for preventing periodontal diseases and dental caries, or the coating agent since the amount of these agents is increased.

It is to be noted that the shapes of the sponge prophy or latch plate 3, or the fixation are not confined by the illustrated examples. While the invention has been described by way of example and in terms of preferred embodiment, it is to be understood that the invention is not limited thereto. All shapes of the core other than those shown in FIGs 1-3 are applicable.